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EXAMINER

PETERSON, CHRISTOPHER K

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2622

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/753,507	Applicant(s) SILVERSTEIN ET AL.	
	Examiner Christopher K. Peterson	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The Amendment After Non-Final Rejection filed on June 25, 2007 has been received and made of record. Examiner notes that the Applicant has amended claims 1 and 12. Claims 1 - 24 are pending in this application.

Response to Arguments

2. Applicant's arguments with respect to claims 1 and 12 have been considered but are moot in view of the new ground(s) of rejection.

In regard to claims 1 and 12, the Applicant has amended the claims to include the limitation "wherein signals from one of the at least two color sub-channels can be scaled or extended by interpolation based on signals from the other of the at least two color sub-channels of the same color channel". The applicant argues that Roddy (US Patent Pub. # 2003/0160881) does not teach the limitations "wherein signals from one of the at least two color sub-channels can be scaled or extended by interpolation based on signals from the other of the at least two color sub-channels of the same color channel" (page 10 and 11). The Examiner agrees that Roddy does not teach the limitation, but the reference of Hamilton (US Patent # 6,330,029) does teach the limitations.

Specifically, noting the Hamilton reference, Fig 3B and Col. 2, 57 – Col. 3, line 14 shows that cyan ($C=(G+B)/2$) can be interpolated to green (G), so one of the at least

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two color sub-channels (cyan and green) can be scaled or extended by interpolation based on signals from the other of the at least two color sub-channels (cyan and green) of the same color channel (green). For this reason, the Examiner believes that Hamilton does teach the limitations of newly amended claims 1 and 12, as will be set forth in further detail below.

Claim Objections

3. Claims 1 and 12 are objected to because of the following informalities: Claim 1 and 12 cite "one color channel comprising at least two color sub-channels and the filters associated with the photo sensors of at least two of the color sub-channels having overlapping spectral bands". Claim 1 and 12 should read "one color channel comprising at least two color sub-channels and the filters associated with the photo sensors of the at least two of the color sub-channels having overlapping spectral bands". Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-6, 10-15, 17-19, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy (US Patent Pub. # 20034/0160881) in view of Hamilton (US Patent # 6,330,029).

As to claim 1, Roddy (Fig. 9 and 6) teaches an image sensing device comprising:

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- a plurality of photo sensors (60) arranged in at least one array, such that each of the photo sensors (60) converts incident light into an output signal, the photo sensors (60) and their respective output signals being divided into a plurality of color channels (Para 49);
- a filter associated with each of the photo sensors (60), the filters selecting light within predetermined spectral bands for conversion by the photo sensors (60) into the output signals, one color channel comprising at least two color sub-channels and the filters associated with the photo sensors (60) of at least two of the color sub-channels having overlapping spectral bands wherein one of the overlapping spectral bands is narrower in bandwidth than another of the overlapping spectral bands (Para 43).

Roddy does not teach wherein signals from one of the at least two color sub-channels can be scaled or extended by interpolation based on signals from the other of the at least two color sub-channels of the same color channel. Hamilton teaches wherein signals from one of the at least two color sub-channels can be scaled or extended by interpolation based on signals from the other of the at least two color sub-channels of the same color channel (green)(Para 55 – 61).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided an interpolation method as taught by Hamilton to the image sensing device of Roddy, because the fault pixels can be corrected in real time without requiring an area memory or the like (Para 13).

As to claim 2, Roddy teaches the image sensing device of claim 1 wherein the photo sensors (60) are arranged in a single array and the filters associated with each photo sensor (60) are arranged in a mosaic of filters located over the photo sensor array (Para 43).

As to claim 3, Roddy teaches the image-sensing device of claim 2 wherein the mosaic of filters is arranged in a Bayer pattern (Para 06).

As to claim 4, Roddy (Fig. 4) teaches the image-sensing device of claim 1 wherein a beam splitter (36 and dichroic mirror 32 and 34) is provided which splits incident light into a plurality of paths and a separate filter/photo sensor array combination is located in each path (30R, 30B, 30BG, 30G), there being a separate path and respective filter/photo sensor array combination provided for each color channel or sub-channel (Para 41).

As to claim 5, Roddy teaches the image-sensing device of claim 1 wherein a beam splitter (36, 32, and 34) is provided which splits incident light into a plurality of paths and a separate filter/photo sensor array combination is located in each path, there being a separate path and respective filter / photo sensor array combination provided for each color channel, and whereby the at least one of the color channels that is further divided into a plurality of sub-channels (30BG, 30G) is represented by a single filter/photo sensor array combination wherein a filter associated with each photo sensor of the plurality of sub-channels is arranged in a mosaic of filters located over the photo sensor array (Para 41).

As to claim 6, Roddy teaches the image sensing device of claim 1 wherein the color channels comprise red (30R), green (30G) and blue (30B) color channels and the green color channel (30G) is divided into a plurality of sub-channels, a first one of which uses a first green filter type (30G) and a second of which uses a second green filter type (30BG) having a spectral band which is narrower in bandwidth than and overlapping with the spectral band of first green filter type (Para 41 and 43).

As to claim 10, Roddy teaches the image sensing device of claim 6 wherein the blue channel is divided into a plurality of sub-channels, a first one of which uses a first blue filter type (30B) and a second of which uses a second blue filter type (30BG) having a spectral band which is narrower in bandwidth than and overlapping with the spectral band of the first blue filter type (Para 41 and 43).

As to claim 11, Roddy teaches the image sensing device of claim 1 wherein the color channels comprise cyan, yellow, magenta and green color channels and the green channel is divided into a plurality of sub-channels, a first one of which uses a first green filter type and a second of which uses a second green filter type having a spectral band which is narrower in bandwidth than and overlapping with the spectral band of first green filter type (Para 49 and 50). The first green channel is made up of cyan and yellow and the second one is made from cyan. Roddy also states the array can be configured in different ways.

As to claim 15, Roddy teaches the method of claim 14 wherein the mosaic of filter elements comprises red (30R), green (30G) and blue (30B) elements associated

with red green and blue color channels and the green color channel comprises two green sub-channels (30G and 30BG)(Para 43).

As to claims 12 – 14, 17 – 19, 23, and 24, these claims differ from claims 1 – 6, 10, and 11 only in that the claims 1 – 6, 10, and 11 are apparatus claims whereas claims 12 – 14, 17 – 19, 23, and 24 are method. Thus method claims 12 – 14, 17 – 19, 23, and 24 are analyzed as previously discussed with respect to claims 1 – 6, 10, and 11 above.

6. Claims 7 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy (US Patent Pub. # 20034/0160881) in view of Hamilton (US Patent # 6,330,029) as applied to claims 1 and 12 above, and further in view of Yang (US Patent # 5923380).

As to claim 7, Roddy in view of Hamilton teach the limitation “first green sub-channel”, Roddy in view of Hamilton does not teach the use of a Kodak™ Wratten™ #58 (green tricolor) filter. Yang teaches the image-sensing device of claim 6 wherein the first green sub-channel uses a Kodak Wratten #58 (green tricolor) filter (Col. 7, line 23-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a Kodak Wratten #58 (green tricolor) filter as taught by Yang to the “first green sub-channel” of Roddy in view of Hamilton, because the use of a known filter color, such as a Kodak Wratten color filter, the spectral sensitivity of the CCD will be known (Col. 3, line 61 – Col. 4, line 10).

As to claim 20, this claim differs from claim 7 only in that the claim 7 is an apparatus claim whereas claim 20 is a method. Thus method claim 20 is analyzed as previously discussed with respect to claim 7 above.

7. Claims 8 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy (US Patent Pub. # 20034/0160881) in view of Hamilton (US Patent # 6,330,029) and further in view of Yang (US Patent # 5923380) as applied to claims 7 and 21 above, and further in view of Kaplan (US Patent #6219140).

As to claim 8, Roddy in view of Hamilton and further in view of Yang teaches the limitation "second green sub-channel", Roddy in view of Hamilton and further in view of Yang does not teach the use of a Kodak Wratten #99 (green) filter. Kaplan teaches the image-sensing device of claim 6, wherein the first green sub-channel uses a Kodak Wratten #99 (green) filter (Col. 4, line 42 – Col. 5, line 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a Kodak Wratten #99 (green) filter as taught by Kaplan to the "second green sub-channel" of Roddy in view of Hamilton and further in view of Yang, because the use of a known color filter, such as a Kodak Wratten color filter, the apparatus will be able to compensate for spectral fluctuations (Col. 2, line 44 – 48).

As to claim 21, this claim differs from claim 8 only in that the claim 8 is an apparatus claim whereas claim 21 is a method. Thus method claim 21 is analyzed as previously discussed with respect to claim 8 above.

8. Claims 9 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy (US Patent Pub. # 20034/0160881) in view of Hamilton (US Patent # 6,330,029) as applied to claims 6 and 19 above, and further in view of Gann (US Patent #7154545).

As to claim 9, note the discussion of Roddy in view of Hamilton above, Roddy in view of Hamilton does not teach wherein the red channel is divided into a plurality of sub-channels. Gann (Fig. 2) teaches the image sensing device of claim 6 wherein the red channel (100 and 102) is divided into a plurality of sub-channels, a first one of which uses a first red filter type and a second of which uses a second red filter type having a spectral band which is narrower in bandwidth than and overlapping with the spectral band of the first red filter type (Col. 5, line 63 – Col. 6, line 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided wherein the red channel is divided into a plurality of sub-channels, a first one of which uses a first red filter type and a second of which uses a second red filter type having a spectral band which is narrower in bandwidth than and overlapping with the spectral band of the first red filter type as taught by Gann to the apparatus of Roddy in view of Hamilton, because the additional spectral responses improve the spectral measurement accuracy, and increase the bit-depth, with little or no incremental cost, and with little or no negative impact on native input sampling rate or signal-to-noise (Col. 3, line 36 – 43).

As to claim 22, this claim differs from claim 9 only in that the claim 9 is an apparatus claim whereas claim 22 is a method. Thus method claim 22 is analyzed as previously discussed with respect to claim 9 above.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roddy (US Patent Pub. # 20034/0160881) in view of Hamilton (US Patent # 6,330,029) as applied to claim 15 above, and further in view of Shizukuishi (US Patent Pub. #2004/0100570).

As to claim 16, note the discussion of Roddy in view of Hamilton above, Roddy in view of Hamilton does not teach wherein the Bayer pattern comprises alternating rows of filters a first of which includes red filters and green filters of the first green sub-channel and the second of which includes blue filters and green filters of the second green sub-channel. Shizukuishi (Fig. 2) teaches the method of claim 15 wherein the Bayer pattern comprises alternating rows of filters a first of which includes red filters (R) and green filters (G2) of the first green sub-channel and the second of which includes blue filters (B) and green filters (G1) of the second green sub-channel (Para 152 - 153).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided wherein the Bayer pattern comprises alternating rows of filters a first of which includes red filters and green filters of the first green sub-channel and the second of which includes blue filters and green filters of the second green sub-channel as taught by Shizukuishi to the apparatus of Roddy in view of Hamilton, because the color solid-state image pickup device is inexpensive to

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manufacture and suppresses the occurrence of a false signal, a false color, and enables high-sensitivity, high-resolution, and faithful color reproduction (Para 29).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher K. Peterson whose telephone number is 571-270-1704. The examiner can normally be reached on Monday - Friday 6:30 - 4:00 EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NgocYen Vu can be reached on 571-272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CKP
22 Aug 2007

A handwritten signature in black ink, appearing to read 'NgocYen Vu', with a long horizontal line extending to the right.

NGOCYEN VU
SUPERVISORY PATENT EXAMINER